

EPO - DG 1

## Claims:

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1. A structural roof system for a vehicle comprising:  
a roof panel;  
a structural element coupled to the roof panel and having a plurality of predetermined removable areas adapted to receive at least one overhead component; and  
a headliner coupled to the structural element, wherein the structural element provides a substantial portion of the structural capability of the roof system.
2. The structural roof system of Claim 1, wherein the roof panel and structural element are integrally formed.
3. The structural roof system of Claim 1, wherein the roof panel is formed as a separate part from the structural element and has sufficient structural strength to withstand finishing, shipping, and assembly to the structural roof system.
4. The structural roof system of Claim 1, wherein the headliner has sufficient structural strength to withstand formation, shipping, and assembly to the structural roof system.
5. The structural roof system of Claim 1, wherein the predetermined removable areas comprise at least one of a cut-out and a knock-out and the at least one component is selected from the group consisting of lights, assist handles, hooks, airbags, antennas, a sun roof, mirrors, consoles, and motors.
6. The structural roof system of Claim 1, wherein the at least one overhead component is selected from the group consisting of wire harnesses, seals, folding canvas, T-tops, glass roof panels, HVAC vents, HVAC ducts, HVAC controls, headrests, sun protection systems, infotainment components and systems, acoustic treatments, instrumentality, navigation systems, storage components, speakers, emergency wiring systems, displays, cameras, switches, impact countermeasures, occupant detection or sensing systems, center high mount stop lights, power and signal distribution components, tools, air purification systems, bezels, close-off trim, rail components, side and/or rear view camera components.
7. The structural roof system of Claim 1 wherein the roof panel has an exterior class "a" surface.

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8. The structural roof system of Claim 7, wherein the "a" surface is provided by a process selected from the group consisting of painting, e-coating, in-mold painting, in-mold coloring, or the use of films.

9. The structural roof panel of Claim 1, wherein the roof panel is formed by a process selected from groups consisting of injection molding, casting, sheet molding, reaction injection molding, lay-up, stamping, and pressing.

10. The structural roof system of Claim 1, wherein the roof panel is formed separately from the structural element and is adhered thereto using a technique selected from the group consisting of adhesives, fittings, Velcro®, snaps, clips, straps, fasteners, rivets, fusing, or welding.

11. The structural roof system of Claim 1, wherein each overhead component is attached to the structural element using a technique selected from the group consisting of adhesives, fittings, Velcro®, snaps, clips, straps, fasteners, rivets, fusing, or welding.

12. The structural roof system of Claim 1, wherein the structural element is a superstructure integrally formed with the roof panel.

13. The structural roof system of Claim 12, wherein the superstructure comprises a plurality of ribs and a plurality of locations adapted to receive overhead components.

14. The structural roof system of Claim 12 wherein the superstructure is substantially coterminous with the roof panel and includes a plurality of receptacles configured to selectively receive the overhead components.

15. The structural roof system of Claim 14 wherein at least a portion of the receptacles are removable for accommodating the overhead components within the superstructure.

16. The structural roof system of Claim 1, wherein the structural element comprises a plurality of spaced apart pods.

17. The structural roof system of Claim 16, wherein each pod includes at least one location adapted to receive an overhead component.

18. The structural roof system of Claim 16, wherein two pods are spaced apart from one another and are arranged to be located adjacent vehicle side rails when the roof system is placed on a vehicle.

19. The structural roof system of Claim 1, further including locators, adapted to facilitate attachment of the structural roof system to a vehicle during assembly.

20. The structural roof system of Claim 1, further comprising one or more belt-line-up components selected from the group consisting of windshields, pillars, a package shelf, seals, covered boxes, wipers, occupant retention systems, side rails, or front and rear cross-car rails.

21. A structural roof system for a vehicle comprising an exterior class A roof panel, a structural layer integrally formed with the roof panel, the structural layer having a plurality of predetermined locations adapted to receive overhead components, a headliner extending across and being attached to the structural layer on a side thereof spaced from the roof panel, a plurality of overhead components attached to the structural layer at the predetermined locations, and wherein a substantial portion of the structural strength of the roof system is provided by the structural layer.

22. The structural roof system of Claim 21, wherein the structural layer includes ribs and at least one of the predetermined locations comprises a structure which can be selectively removed.

23. A structural roof system for a vehicle comprising:  
a roof panel;  
a superstructure having a plurality of preformed receptacles at predetermined locations adapted to receive overhead components;  
the superstructure having a first and a second side, the roof panel being attached to the first side;  
a headliner extending across and being attached to the second side of the superstructure; and  
a plurality of overhead components attached through the headliner to the receptacles of the superstructure, and wherein a substantial portion of the structural strength of the roof system is provided by the superstructure.

24. The structural roof system of Claim 23, wherein the superstructure comprises a network of supporting rails.

25. A structural roof system for a vehicle comprising a roof panel, at least two pods each having first and second sides, the pods being adapted to receive overhead components, the roof panel being attached to the first sides of the pods, a headliner extending across and being attached to the second sides of the pods, a plurality of overhead components being attached to the pods, and wherein a substantial portion of the structural strength of the roof system is provided by the pods.

26. The structural roof system of Claim 25, wherein the pods are elongate and extend in the fore and aft direction with respect to the vehicle with which the roof system will be used.

27. A modular structural roof system for attachment to a main body of a vehicle, the roof system comprising an exterior roof panel, a headliner spaced from the roof panel, a structural member located between and coupled to the headliner and roof panel, at least one of an A-pillar, a B-pillar and a C-pillar coupled to the structural member, the roof system including a plurality of preinstalled overhead components and at least one preinstalled belt-line-up component or system formed as part of the roof system.

28. The modular structural roof system of Claim 27, wherein the belt-line-up components are selected from the group consisting of pillars, windshields, wipers, package shelves, coweling, seals, occupant retention systems, side rails or cross-car rails.

29. The modular structural roof system of Claim 27, further comprising a package shelf coupled to the C-pillar.

30. The modular structural roof system of Claim 27, further comprising a front plate coupled to the A-pillar.

31. The modular structural roof system of Claim 27, further comprising locators configured to align the roof system with the main body of the vehicle.